

**BY ORDER OF THE
SECRETARY OF THE AIR FORCE**

**AIR FORCE OCCUPATIONAL SAFETY AND
HEALTH STANDARD 91-43**

1 OCTOBER 1997



Safety

FLAMMABLE AND COMBUSTIBLE LIQUIDS

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OPR: HQ AFSC/SEGS
(SMSgt Pennie Hardesty)
Supersedes AFOSH Standard 127-43,
21 September 1980

Certified by: HQ AFSC/SEG
(Colonel Robert W. Scott)
Pages: 38
Distribution: F

The criteria in this standard are the Air Force's minimum safety, fire protection, and occupational health requirements for all Air Force flammable and combustible storage, use, and handling operations. Major commands (MAJCOM), direct reporting units (DRU), and field operating agencies (FOA) may supplement this standard when additional or more stringent safety, fire prevention, and health criteria are required. Refer to Air Force Instruction (AFI) 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program*, for instructions on processing supplements or variances. Report conflicts in guidance between this standard, federal standards, or other Air Force directives through MAJCOM, DRU, or FOA ground safety offices to Headquarters Air Force Safety Center, Ground Safety Division, Safety Engineering and Standards Branch (HQ AFSC/SEGS), 9700 Avenue G, SE, Suite 222, Kirtland AFB NM 87117-5670.

This standard applies to all US Air Force organizations, including all US Air Force Reserve personnel and when Air National Guard personnel are on federal service. This standard addresses key flammable and combustible liquids criteria, references other Air Force directives that cover specific aspects of flammable and combustible liquids storage, use, and handling, and implements pertinent portions of regulatory Occupational Safety and Health Administration (OSHA) Standard Title 29 Code of Federal Regulations (CFR) 1910.106, *Flammable and Combustible Liquids*. It includes the storage, use, and handling of flammable and combustible liquids in containers or tanks of 60 gallons or less and in portable tanks up to 660 gallons capacity. It also includes storage in fuel tanks of 2 gallons or less located on small gasoline-powered equipment such as lawnmowers and snow-blowers. It does not apply to petroleum products in fuel tanks of motor vehicles, aircraft, boats, other watercraft, large portable or stationary engines, petroleum products in portable tanks over 660 gallons, alcoholic beverages when packed in individual glasses, plastic, metal or ceramic containers not exceeding 4 liters in volume, medicines, foodstuffs and cosmetics, special purpose vehicles designed and maintained for the storage and transportation of flammable or combustible liquids, or liquids having no flashpoint which may not burn under normal conditions.

SUMMARY OF REVISIONS

This document is substantially revised and must be completely reviewed.

This revision incorporates the general storage, use, and handling of flammable and combustible liquids. Sections of the standard have been rearranged into subdivisions to give the reader a more detailed overview of requirements by specific applications. The requirement to disconnect the spark plug from small gasoline equipment in extended off-season storage has been deleted. Storage cabinet criteria has been corrected (paragraph 3.4.). A glossary of references, abbreviations, acronyms, and terms is provided at **Attachment 1**. **NOTE:** AFOSH 127-series standards are being converted to 91-series standards and the 161-series to 48-series standards. However, not all standards have been converted as of the effective date of this standard. To help you locate these documents, references to AFOSH standards are stated in the updated series and standard number, with the outgoing series and standard number stated as “formerly designated as” in the ‘references’ section of **Attachment 1**.

Chapter 1

HAZARDS AND HUMAN FACTORS

1.1. Hazards . Personnel working or handling flammable and combustible liquids may be exposed to spills of liquids, hazardous vapors, accidental mixture of flammable and combustibles, or industrial hazards associated with the handling of containers and products. Physical hazards from flammable and combustible materials include fires and explosions. Preventing fires and explosions caused by static electricity or unauthorized or defective electrical equipment requires increased attention during the handling and storage of flammable and combustible liquids.

1.1.1. Flammable Liquids. A liquid with a closed cup flashpoint below 100 degrees Fahrenheit (F) (37.8 degrees Celsius [C]) and having a vapor pressure not exceeding 40 pounds per square inch, gauge (psig) (2068 millimeters [mm] mercury [Hg]) at 100 degrees F (37.8 degrees C). Flammable liquids are categorized as Class I liquids, and are further subdivided as follows: (Reference National Fire Protection Association [NFPA] 30, *Flammable and Combustible Liquids Code*.)

1.1.1.1. Class IA are those that have a flashpoint below 73 degrees F (22.8 degrees C) and have a boiling point below 100 degrees F (37.8 degrees C). (Reference NFPA 30.)

1.1.1.2. Class IB are those that have a flashpoint below 73 degrees F (22.8 degrees C) and have a boiling point at or above 100 degrees F (37.8 degrees C). (Reference NFPA 30.)

1.1.1.3. Class IC are those that have a flashpoint at or above 73 degrees F (22.8 degrees C) and below 100 degrees F (37.8 degrees C). (Reference NFPA 30.)

1.1.2. Combustible Liquid. A liquid having a closed cup flashpoint at or above 100 degrees F (37.8 degrees C). Combustible liquids are categorized as Class II or Class III liquids and they are further subdivided as follows: (Reference NFPA 30.)

1.1.2.1. Class II liquids are those having a flashpoint at or above 100 degrees F (37.8 degrees C) and below 140 degrees F (60 degrees C). (Reference NFPA 30.)

1.1.2.2. Class IIIA liquids are those having flashpoint at or above 140 degrees F (60 degrees C) and below 200 degrees F (93.35 degrees C), except any mixture having components with flashpoints of 200.5 degrees F (93 degrees C). (Reference NFPA 30.)

1.1.2.3. Class IIIB liquids are those having flashpoints at or above 200 degrees F (93 degrees C). **NOTE:** This standard does not cover Class IIIB liquids. Where the term Class III liquids is used in this standard, it shall mean only Class IIIA liquids. (Reference NFPA 30.)

1.2. Human Factors . Human factors fall into two major categories:

1.2.1. Attitude, emotion, job or domestic pressure, distractions, job knowledge, and hurrying; or

1.2.2. Physical, such as fatigue, physical strength, and reactions to prescriptions, medications, or drugs. These factors may affect workers who, by their commission (what they do) or by their omission (what they fail to do), can contribute to or even be the cause of a mishap. Some examples are:

1.2.2.1. Ignoring directions from supervisors and workleaders.

1.2.2.2. Use of personal protective equipment (PPE) or tools while angry or distracted.

1.2.2.3. Performing a task while thinking about personal problems.

- 1.2.2.4. Not following established procedures or taking unauthorized shortcuts to save time.
- 1.2.2.5. Performing job tasks while taking prescribed medications that cause drowsiness.
- 1.2.2.6. Performing job tasks while under the influence of alcohol or illegal drugs.
- 1.2.2.7. Using equipment when not properly trained or qualified.
- 1.2.2.8. Being unaware of the hazardous properties of flammable and combustibles and their control. (29 CFR 1910.1200, *Hazard Communication*).

Chapter 2

RESPONSIBILITIES

2.1. Air Staff . All Air Staff elements will ensure policies and procedures are consistent with the spirit and intent of this standard.

2.2. Air Force Safety Center (HQ AFSC). Will:

2.2.1. Provide professional advice and guidance applicable to flammable and combustible liquids in the realm of safety..

2.2.2. Act as approval authority for safety variances. **NOTE:** Requests for variances shall be processed through MAJCOM, DRU, or FOA ground safety offices.

2.3. Air Force Surgeon General (HQ AF/SG) . Will provide professional advice and guidance applicable to flammable and combustible liquids in the realm of sampling, analysis, and health risk appraisals and hazard evaluations.

2.4. Air Force Civil Engineer Support Agency (HQ AFCESA) . The HQ AFCESA Fire Protection Operations Office (CEXF) officials will provide professional advice and guidance applicable to flammable and combustible liquids in the realm of fire protection and emergency response and rescue; fire fighter certification program; crash, fire, and rescue North Atlantic Treaty Organization (NATO) programs; hazardous materials (HAZMAT) programs; and HAZMAT response checklists.

2.5. Major Commands (MAJCOM), Direct Reporting Units (DRU), and Field Operating Agencies (FOA). Will provide program oversight and supplements, as necessary.

2.6. Installation Ground Safety (SEG). With assistance from the ground safety staff, the Chief of Ground Safety will:

2.6.1. Serve as the focal point for implementation of this standard.

2.6.2. In conjunction with Bioenvironmental Engineering (BE) staff, assist functional managers and supervisors in the selection of PPE.

2.6.3. When required, assist the functional managers in obtaining appropriate training for handling of flammable and combustible liquids.

2.7. Functional Managers and (or) Supervisors . Shall:

2.7.1. Provide all workers and handlers of flammable or combustibles with the appropriate level of training associated with tasks and associated hazards related to the work environment.

2.7.2. Ensure personnel engaged in activities that involve the handling or use of hazardous materials receive training per requirements in AFOSH Standard 48-21, *Hazard Communication*.

2.7.3. Ensure individuals involved in dispensing of flammable or combustible liquids are instructed on the hazards of static electricity.

2.7.4. Make sure personnel handling and storing flammable or combustible liquids are trained in fire prevention and protection as it relates to their particular duties.

2.7.5. Ensure appropriate spill and containment control materials are readily available at storage or dispensing areas.

2.7.6. Ensure PPE is available and appropriately worn when handling flammable or combustible liquids.

Chapter 3

GENERAL REQUIREMENTS

3.1. General Information . Flammable and combustible liquids require careful handling at all times. Many of these liquids are used by the Air Force and mishandling of these is a significant cause of injury or occupational illness. Hazards associated with use of flammable or combustible liquids include explosions, burns from fire, chemical burns, asphyxiation, inhalation of vapors, absorption through the skin, skin irritation, and eye damage from direct contact or exposure. The volatility of flammable or combustible liquids is increased by heat and when heated to temperatures higher than their flashpoints, they present higher hazards.

3.1.1. There are also some solvents used by the Air Force with flammable characteristics that must be handled with care. Solvents can burn or explode if handled or used improperly.

3.1.2. Air Force personnel must be made aware of the hazards associated with the use of flammable and combustible liquids at the worksite. Job safety training should include, as a minimum: information on the need for and use of approved PPE; maintenance and care of PPE, safe chemical handling procedures; and emergency treatment practices in case of exposure, ingestion or inhalation of liquids or vapors. Refer to AFOSH Standard 91-31, *Personal Protective Equipment*, and AFOSH Standard 48-21 for additional guidance.

3.1.3. There are some flammable and combustible liquids which are highly reactive with other substances, subject to explosive decomposition, or with other properties that dictate extra safeguards. Consult your local ground safety and (or) BE or fire protection staff when in doubt. The following lists some common water-reactive substances:

Alkali Metals (Lithium [Li]),

Potassium (Kalium [K]),

Sodium (Natrium [Na]),

Cerium (Ce)

Arsenides

Carbides

Decarboranes

Nitrides

Phosphorous Trichloride

Selenides

Borides

Calcium

Hydrides (Inorganic and organic)

Phosphides

Phosphorous Pentasulfide

Tellurides

NOTE:

Water-reactive materials should not be stored where fire protection sprinklers are in place. These materials should not be stored with flammable or combustible liquids. (Refer to OSHA Interpretation, 29 CFR 1910.106.)

3.1.4. Sparks resulting from the accumulation of static electricity can be a cause of ignition of flammable vapors or gases. The flow of flammable liquids through non-conductive hoses or passages can

also produce static charges. Unless safely conducted to a ground, these charges accumulate and are capable of producing an ignition source. (Reference NFPA 30.)

3.1.5. Supervisors and workers engaged in operations where fuels, solvents, or other flammable liquids are used must be constantly alert to avoid unsafe practices. It is hazardous to use fuels such as gasoline to clean floors or clothing; to use solvents such as lighter fluid; and to use open solvent or gasoline containers near electrical equipment or pilot lights. The use of low-flashpoint petroleum solvents should be avoided when possible. Open flames, open heaters, equipment not properly grounded, and nonexplosion-proof electrical equipment used in the presence of flammable or combustible liquids should be avoided. (Reference NFPA 30.)

3.2. Facility Pre-Fire Plans . Facility pre-fire plans will be developed for flammable and combustible liquid warehouses, laboratory, and storage buildings. These plans will be maintained in the fire department communications center and on vehicles designated by the fire chief (see AFI 32-2001, *The Fire Protection Operations and Fire Prevention Program*). The plans include the hazardous materials contained in installation facilities, their locations, and emergency procedures to be followed.

3.3. General Requirements — Containers . Containers and portable tanks will be purchased to meet the handling, storage, and dispensing requirements specified in this standard for the type product concerned.

3.3.1. The capacity of flammable and combustible liquid containers will be according to table 3.1., except that glass or plastic containers of no more than 1-gallon capacity may be used for Class IA or IB flammable liquids if: (Reference NFPA 30.)

3.3.1.1. Such liquid either would be rendered unfit for its intended use by contact with metal or would excessively corrode a metal container so as to create a leakage; and

3.3.1.2. The user's process would either require more than 1 pint of a Class IA liquid or more than 1 quart of a Class IB liquid of a single assay lot to be used at one time, or would require the maintenance of an analytical standard liquid of a quantity which is not met by the specified standards of liquids available, and the quantity of the analytical standard liquid required to be used in any one control process exceeds one-sixteenth the capacity of the container allowed under **Table 3.1.** for the class of liquid.

3.3.2. Flammable liquids shall be kept in covered containers when not in use. (Reference NFPA 30.)

3.3.3. Storage of flammable and combustible liquids shall be prohibited in office occupancies except that which is required for maintenance and operation of building and operation of equipment. Such storage shall be in closed metal containers stored in a storage cabinet or in safety cans or an inside storage room not having a door that opens into that portion of the building used by personnel. (Reference NFPA 30.)

3.4. Storage Cabinets . Not more than 120 Gallons of Class I, Class II, and Class IIIA liquids may be stored in a storage cabinet. The combined total of Class I and Class II liquids may not exceed 60 gallons per storage cabinet. Not more than three such cabinets (120 gallons each) may be located in a single fire area except in an industrial area. (Refer to **Attachment 1** for definition of a fire area.) Additional cabinets may be located in the same fire area of an industrial area if the additional cabinet, or group of more than three (120 gallons each) cabinets, is separated from other cabinets or group of cabinets by at least 100

feet. **NOTE:** The limit of three cabinets in a single area can be increased where smaller cabinets are used. However, the maximum amount of flammable storage cannot exceed that which could be stored in three 120 gallon capacity cabinets, (360 gallons total). (Reference NFPA 30.)

3.4.1. Cabinets will be labeled with conspicuous lettering, “Flammable — Keep Fire Away.” Additional guidance for marking storage containers is contained in AFOSH Standard 91-44, *Safety Color Coding, Labeling, and Marking*.

3.4.2. The cabinet is not required to be vented for fire protection purposes; however, the following shall apply: (Reference NFPA 30.)

3.4.2.1. If the cabinet is vented for whatever reasons, the cabinet inlet shall be vented outdoors in such a manner that will not compromise the specified performance of the cabinet. (Reference NFPA 30.)

3.4.2.2. If the cabinet is not vented, the vent opening shall be sealed with the bungs supplied with the cabinet or with bungs specified by the manufacturer of the cabinet. (Reference NFPA 30.)

Table 3.1. Maximum Allowable Size Containers and Portable Tanks.

Class	Flammable Liquids			Combustible Liquids	
	IA	IB	IC	II	II
Container Type Glass or approved plastic ¹	1 pt	1 qt	1 gal	1 gal	1 gal
Metal (Other than Department of Transportation [DOT] Drums) ²	1 gal	4 gal	5 gal	5 gal	5 gal
Safety cans	2 gal	5 gal	5 gal	5 gal	5 gal
Metal Drums (DOT Specification)	60 gal	60 gal	60 gal	60 gal	60 gal
Approved portable tanks	660 gal	660 gal	660 gal	660 gal	660 gal
Polyethylene DOT specification 34 or as authorized by DOT exception.	1 gal	5 gal	5 gal	60 gal	60 gal

Reference 29 CFR 1910.106, Table H-12.

Notes:

¹ Nearest metric size is also acceptable for glass and plastic containers listed.

² If metal containers must be avoided because of chemical reaction with their container then the nearest metric equivalent size may be used.

3.4.3. Storage cabinets that meet at least one of the following sets of requirements shall be acceptable for the storage of liquids.

3.4.3.1. Storage cabinets that are designated and constructed to limit the internal temperature at the center of the cabinet and 1 inch (2.5 centimeter [cm]) from the top of the cabinet to not more than 325 degrees F (162.8 degrees C), when subjected to a 10-minute fire test that simulates the fire exposure of the standard time-temperature curve specified in NFPA 251, *Standard Methods of Tests of Fire Endurance of Building Construction and Materials*, shall be acceptable. All joints and seams shall remain tight and the door shall remain securely closed during the test.

3.4.3.2. Metal storage cabinets that are constructed in the following manner shall be acceptable. The bottom, top, door, and sides of the cabinet shall be at least No. 18 gauge sheet steel and shall be double-walled, with 1-1/2 inch (3.8 cm) air space. Joints shall be riveted, welded, or made tight by some equally effective means. The door shall be provided with a three-point latch arrangements and the door sill shall be raised at least 2 inches (5 cm) above the bottom of the cabinet to retain spilled liquid within the cabinet.

3.4.3.3. Wooden cabinets constructed in the following manner shall be acceptable. The bottom, sides, and top shall be constructed of exterior grade plywood that is at least 1 inch (2.5. cm) thick and of a type that will not break down or delaminate under fire conditions. All joints shall be rabbetted and shall be fastened in two directions with wood screws. Where more than one door is used, there shall be a rabbetted overlap of not less than 1 inch (2.5. cm). Doors shall be equipped with a means of latching and hinges shall be constructed and mounted in such a manner as to not lose their holding capacity when subjected to fire exposure. A raised sill or pan capable of containing a 2 inch (5 cm) depth of liquid shall be provided at the bottom of the cabinet to retain spilled liquid within the cabinet.

3.4.3.4. Listed storage cabinets that have been constructed and tested according to requirements in paragraph 3.4.3.1. shall be acceptable.

3.5. Inside Storage Rooms:

3.5.1. Inside storage rooms will be constructed to meet the specifications of NFPA Standard 251 and the required fire-resistive rating for their use. Openings to other rooms or buildings will have noncombustible liquid-tight raised sills or ramps at least 4 inches in height or, as an alternative, the floor in the storage area will be at least 4 inches lower than the surrounding floor. Rooms will be liquid-tight where walls join the floor. An additional alternate to the sill or ramp is an open-grated trench inside the room draining to a safe location. Self-closing fire rated doors meeting the requirements of NFPA Standard 80, *Standard for Fire Doors and Fire Windows*, will be used. Where other portions of the building or other properties are exposed, windows will be protected as required by NFPA Standard 80. Wood of at least 1-inch nominal thickness may be used for shelving, racks, dunnage, scuffboards, and floor overlay. (Reference NFPA 30.)

3.5.2. Class I liquids shall not be stored or handled within a building having a basement or pit which flammable vapors can travel, unless such area is provided with ventilation that will prevent the accumulation of flammable vapors. (Reference NFPA 30.)

3.6. Electrical . Electrical wiring and equipment located in inside storage rooms used for the storage of Class I liquids shall be suitable for Class I, Division 1 hazardous (Reference 29 CFR 1926.152, *Flammable and Combustible Liquids*) (classified) locations.

3.6.1. Electrical equipment and wiring in inside storage rooms used for the storage of only Class II and Class III liquids shall be suitable for general purpose use. (See NFPA Standard 70, *National Electrical Code*, for information on the design and installation of electrical wiring and equipment).

3.6.2. Transfer of flammable liquids from one container to another shall be done when containers are electrically interconnected (bonded). When flammables are not being transferred from one container to another, there is no requirement to have the containers bonded. (Reference 29 CFR 1910.106.)

3.7. Ventilation . Liquid storage areas where dispensing is conducted shall be provided with either a gravity or continuous mechanical exhaust ventilation system. Areas in which flammable or combustible liquids are transferred simultaneously of quantities greater than 5 gallons from one container to another to tank or container, shall be separated from the other operation by 25-foot distance or by construction having a fire resistance of at least 1 hour. Drainage or other means shall be provided to control spills. Adequate natural or mechanical ventilation shall be provided to maintain the concentration of flammable vapors at or below 10 percent or 2 percent Lower Explosive Limit (LEL) of the flammable limit. Mechanical ventilation shall be used if Class I liquids are dispensed within the room. (Reference 29 CFR 1910.106.)

3.7.1. Exhaust air shall be taken from a point near a wall on one side of the room and within 1 foot of the floor with one or more make-up inlets located on opposite side of the room within 1 foot of the floor. The location of both the exhaust and inlet air openings shall be arranged to provide air movement across all portions of the floor to prevent accumulation of flammable vapors. Exhaust from the room shall be directly to the exterior of the building without recirculation. (Reference 29 CFR 1910.106.)

3.7.2. Mechanical ventilation systems shall provide for a complete change of air within the room at least 6 times per hour. If a mechanical exhausting system is used, it shall be controlled by a switch located outside the door. The ventilating equipment and any lighting fixtures shall be operated by the same switch. An electric pilot light shall be adjacent to the switch if flammable liquids are dispensed within the room. The mechanical ventilation system for dispensing areas shall be equipped with an airflow switch or equally reliable method that is interlocked to sound an audible alarm upon failure of the ventilation system. (Reference 29 CFR 1910.106.)

3.7.3. Exhaust and lighting system controls shall be located outside the door. This switch shall control both the lights and ventilation systems. The switch shall be illuminated. (Reference 29 CFR 1910.106.)

3.7.4. Ventilation ducts and air flow requirements shall comply with AFOSH Standard 48-2, *Industrial Ventilation*, and NFPA 91, *Standard for Exhaust Systems for Air Conveying of Materials*.

3.8. Additional Requirements for Inside Rooms . For storage capacity and required fire resistive ratings for inside rooms, refer to table 3.2. Storage rooms will not have an opening into any portion of a building used by the public. At least one clear 3-foot wide aisle will be maintained in all inside storage areas. Containers in excess of 30 gallon capacity will not be stacked one upon the other. Dispensing will be according to requirements in paragraph 3.6. for Class I flammable liquids. All other dispensing will be by approved pump or self-closing faucet only. (Reference 29 CFR 1910.106.)

3.8.1. At least one portable fire extinguisher having a rating of 20-B shall be located no closer than 10 feet nor more than 50 feet, from any Class I or Class II liquid storage area. Extinguisher should be located outside the storage room. (Reference NFPA 30.)

3.8.2. At least one portable fire extinguisher rated not less than 10-BC shall be located between 10 and 25 feet of any Class I or Class II liquid storage area outside of storage room but inside a building. (Reference NFPA 30.)

3.8.3. Installed fire suppression systems shall be approved per requirements in Military Handbook (MIL-HDBK)-1008, *Fire Protection for Facilities, Engineering, Design, Construction*, (see AFOSH Standard 91-56, *Fire Protection and Prevention*, for guidance). (In addition, consult the installation fire department. [Reference NFPA 30].)

Table 3.2. Storage Inside Rooms.

Fire Protection ² Provided	Fire Resistance	Maximum Size	Total Allowable Quantities ¹ (gals/sq ft floor area)
Yes	2 Hour	500 sq ft	10
No	2 Hour	500 sq ft	4
Yes	1 Hour	150 sq ft	5
No	1 Hour	150 sq ft	2

Reference 29 CFR 1910.106, Table H-13.

NOTES:

¹ If metric containers are being stored, use the nearest metric equivalent.

² Fire protection system will be sprinkler, water spray, or equivalent.

3.9. Storage Inside Buildings . When the storage of flammable or combustible liquids is required and the storage is incidental and not the primary purpose of the area, storage will comply with the following: (Reference NFPA 30.)

3.9.1. Storage of flammable or combustible liquids shall not physically obstruct a means of egress from the building or area. Flammable and combustible liquids will not be placed in such a manner that a fire would prevent safe egress from the area. (Reference NFPA 30.)

3.9.2. Containers will remain tightly sealed except when transferred, poured, or applied. Workers will remove only that portion of liquid from the storage container required to accomplish a particular job. (Reference NFPA 30.)

3.9.3. Leaking containers shall be removed to a safe location outside the building and the contents transferred to an undamaged container. (Reference NFPA 30.)

3.9.4. If a flammable and combustible liquids storage building is used, it will be a one-story building devoted principally to the handling and storing of flammable or combustible liquids. The building will have 2-hour fire-rated exterior wall having no openings within 10 feet of the stored material. (Reference NFPA 30.)

3.9.5. Flammable paints, oils, and varnishes in 1 to 5 gallon containers, used for building maintenance purposes, may be stored temporarily in closed metal containers outside approved storage cabinets or rooms if kept at the job site for less than 10 calendar days. (Reference NFPA 30.)

3.9.6. At least one portable fire extinguisher having a rating of not less than 12-B units shall be located outside of, but not more than 10 feet from the door opening into any room used for storage of flammable or combustible liquids. (Reference NFPA 30.)

3.9.7. Water reactive materials will not be stored in the same room with flammable or combustible liquids. **EXCEPTION:** Small quantities may be stored in laboratories. Refer to paragraphs 3.1.4.1. and 3.13.1.2. (Reference NFPA 30.)

3.9.8. Commissary storage areas will be according to table 3.3. Buildings or portions of such buildings utilized for flammable and (or) combustible storage will be isolated by standard fire walls approved for the type and quantity of liquids being stored. Materials which create no fire hazard may be stored in the same area. (Reference 29 CFR 1910.106.)

3.9.9. When flammable or combustible liquids warehouse or storage is within 50 feet or less of a building or adjoining property line that may be built upon, the wall facing the building or property lines will be blank wall having a fire-resistance rating of at least 2 hours. (Reference NFPA 30.)

3.9.10. The total quantity of liquids within a building is not restricted, but arrangement of storage will comply with tables 3.3 and 3.4. (Reference 29 CFR 1910.106.)

3.9.11. Stacked containers of flammable liquids will be separated by pallets or dunnage, where necessary, to provide stability and to prevent excessive stress on container walls. (Reference NFPA 30.)

3.9.12. Portable tanks stored over one tier high will be designed to nest securely, without dunnage. Adequate materials handling equipment will be available to handle tanks safely at the upper tier level. (Reference NFPA 30.)

3.9.13. No stack will be closer than 3 feet to the nearest beam, chord, girder, or other construction member and will be at least 3 feet below sprinkler deflector or discharge orifice of water spray or other installed fire protection systems. (Reference NFPA 30.)

3.9.14. Aisles at least 3 feet wide shall be provided for clear access to all doors, windows, or fire department standpipe connections. (Reference NFPA 30.)

3.9.15. All containers shall be clearly labeled to identify contents and indicate hazards. (Reference NFPA 30.)

3.10. Outside Storage . Table 3.5. and 3.6 provide maximum quantities and separation criteria for outside storage of flammable and combustible liquids. (Reference NFPA 30.)

3.10.1. Maximum storage of 1,100 total gallons of flammable or combustible liquids may be located adjacent to other buildings provided: (Reference NFPA 30.)

3.10.1.1. A minimum distance of 10 feet between buildings and nearest container of flammable or combustible liquid is maintained;

3.10.1.2. The storage area is graded according to paragraph 3.10.3.; and

3.10.1.3. The storage area is protected against tampering or unauthorized entry where necessary and is kept free of weeds, debris, and other combustible material not necessary to the storage.

3.10.2. Where the quantity stored exceeds 1,100 gallons, refer to **Table 3.6.** for quantities and separation distances. (Reference NFPA 30.)

3.10.3. The storage area will be graded to divert possible spills away from buildings or other facilities or will be surrounded by a curb at least 6 inches high. When curbs are used, provisions will be made for draining accumulations of ground or rain water or spills of flammable or combustible liquids. Drains shall terminate at a safe location and shall be accessible to operation under fire conditions. (Reference NFPA 30.)

3.10.4. At least one portable fire extinguisher rated not less than 20-B will be located not less than 10 feet, nor more than 25 feet, travel distance of any Class I or Class II liquid storage area outside of a storage room. (Reference NFPA 30.)

3.10.5. Installed fire suppression systems will be approved per requirements in MIL-HDBK-1008 (see AFOSH Standard 91-56 for guidance). In addition, the installation fire department will be consulted.

3.10.6. Containers and portable tanks used for Class I liquids will be electrically grounded and bonded during liquid transfer. Positive measures will be taken to eliminate any source of ignition; open flames, electrical, smoking, cutting and welding, hot surfaces, static, mechanical sparks, radiant heat, or spontaneous ignition sources. (Reference NFPA 30.)

3.10.7. All containers having flammable or combustible materials will be protected from heat sources since heat will cause the content to expand and pressurize the container. This, in turn, may rupture the container. Open flame or smoking will not be permitted in or within 50 feet of flammable or combustible liquid storage areas. (Reference NFPA 30.)

3.10.8. Welding, cutting, or brazing will be accomplished according to AFOSH Standard 91-5, *Welding, Cutting, and Brazing*. (Reference 29 CFR 1910.106 and NFPA 30.)

3.11. Handling Flammable and Combustible Liquids . Flammable and combustible liquids will be drawn from or transferred into vessels, containers, or portable tanks within a building only through a closed piping system, from safety cans, by means of a device through the top, or from a container or portable tanks by gravity through an approved self-closing valve. Transferring by means of air pressure on the container or portable tanks is prohibited. (Reference 29 CFR 1910.106.)

3.11.1. Only approved safety containers will be used for transporting and dispensing flammable liquids in quantities of 5 gallons or less. (Reference 29 CFR 1910.106.)

3.11.2. Flammable liquids will be kept in covered containers when not actually in use. (Reference 29 CFR 1910.106.)

3.11.3. Means should be provided to clean up and remove spills. Refer to appropriate Material Safety Data Sheet (MSDS) for spill clean-up procedures and PPE required. (Reference 29 CFR 1910.106.)

3.11.4. Class I liquids will be used only where there are no open flames or other sources of ignition within the area or possible path of vapor travel. (Reference 29 CFR 1910.106.)

3.11.5. Safety cans or other portable containers of flammable liquids having a flashpoint at or below 80 degrees F will be red in color with some additional clearly visible identification either in the form of a yellow band around the container or the name of the contents conspicuously stenciled or painted on the container in yellow, unless required by technical data to be painted “tonedown”. The contents will be conspicuously stenciled in black. **EXCLUSION** — shipping containers. (Reference NFPA 30.)

Table 3.3. Indoor Container Storage.

Class Liquid	Storage Level	Protected Storage (Sprinkler System)	Unprotected Storage
		<u>Maximum per Pile</u> Gallons	<u>Maximum per Pile</u> Gallons
IA	Ground & Upper Floors	2,750	660
	55 Gallon drums	(50)	(12)
	Basement	Not Permitted	Not Permitted
IB	Ground & Upper Floors	5,500	1,375
	55 Gallon drums	(100)	(25)
	Basement	Not Permitted	Not Permitted
IC	Ground & Upper Floors	16,500	4,125
	55 Gallon drums	(300)	(75)
	Basement	Not Permitted	Not Permitted
II	Ground & Upper Floors	16,500	4,125
	55 Gallon drums	(300)	(75)
	Basement	5,500	Not Permitted
III	Ground & upper Floors	55,000	13,750
	55 Gallon drums	(1000)	(250)
	Basement	8,250	Not Permitted
	55 Gallon drums	(450)	

Reference 29 CFR 1910.106, Table H-14.

NOTES:

- 1 When two or more classes of materials are stored in a single pile, the maximum gallonage permitted in that pile will be the smallest of the two or more separate gallonages.
- 2 Aisles in general purpose warehouse storage will be provided so no container is more than 12 feet from an aisle. Main aisles shall be at least 3 feet wide and side aisles at least 4 feet wide.
- 3 Each pile shall be separated from each other by at least 4 feet.
- 4 Refer to paragraph 3.13. for information on the storage of flammable aerosol containers classified as Class I liquids and stored in military exchanges, commissaries, or associated retail stores.
- 5 Numbers in parentheses indicate corresponding number of 55 gallon drums.

Table 3.4. Indoor Portable Tank Storage.

Class	Storage Level	Protected Storage (Sprinkler System)	Unprotected Storage
		<u>Maximum per Pile</u>	<u>Maximum per Pile</u>
<u>Liquid</u>		<u>Gallons</u>	<u>Gallons</u>
IA	Ground & Upper Floors	Not Permitted	Not Permitted
	Basement	Not Permitted	Not Permitted
IB	Ground & Upper Floors	20,000	2,000
	Basement	Not Permitted	Not Permitted
IC	Ground & Upper Floors	40,000	5,500
	Basement	Not Permitted	Not Permitted
II	Ground & Upper Floors	40,000	5,500
	Basement	20,000	Not Permitted
III	Ground & Upper Floors	60,000	22,000
	Basement	20,000	Not Permitted

Reference 29 CFR 1910.106, Table H-15.

NOTES:

- 1 When one or more classes of material are stored in a single pile, the maximum gallonage permitted in the pile will be the smallest of the two or more separate maximum gallonages.
- 2 Aisles will be provided so no portable tank is more than 12 feet from an aisle. Main aisles will be at least 8 feet wide and side aisles at least 4 feet wide.
- 3 Each pile will be separated from each other by at least 4 feet.

Table 3.5. Outdoor Container Storage.

Liquid Classification	Maximum Gallons per pile ¹	Distance between piles (ft) ²	Distance to property line that can be built upon (ft) ^{3 & 4}	Distance to street, alley, public way (ft) ⁴
IA	1,100	5	20	10
IB	2,200	5	20	10
IC	4,400	5	20	10
II	8,800	5	10	5
III	22,000	5	10	5

Reference 29 CFR 1910.106, Table H-16

NOTES:

- ¹ When two or more classes of material are stored in a single pile, the maximum gallonage in that pile shall be the smallest of the two or more separate gallonages.
- ² Within 200 feet of each container, there shall be a 12-foot wide access way to permit approach of fire control apparatus.
- ³ The distance listed applies to properties that have protection for exposures as defined. If there are exposures, and such protection for exposures do not exist, the distance in column 4 (distance to property line that can be built upon) shall be doubled.
- ⁴ When total quantity stored does not exceed 50 percent of maximum pile, the distance in column 4 (distance to property line that can be built upon) and column 5 (distance to street, alley, public way) may be reduced 50 percent, but not less than 3 feet.

Table 3.6. Outdoor Portable Tank Storage.

Class	Maximum per pile (Gallons) ¹	Distance between piles (ft) ²	Distance to property line that can be built upon (ft) ^{3 & 4}	Distance to street, alley, public way ⁴
-------	---	--	--	--

IA	2,200	5	20	10
IB	4,400	5	20	10
IC	8,800	5	20	10
II	17,600	5	10	5
III	44,000	5	10	5

Reference 29 CFR 1910.106, Table H-17.

NOTES:

¹ When two or more classes of material are stored in a single pile, the maximum gallonage in that pile shall be the smallest of the two or more separate gallonage.

² Within 200 feet of each portable tank, there shall be a 12-foot wide access way to permit approach of fire control apparatus.

³ The distance listed apply to properties that have adequate fire protection for structures adjacent to the storage tanks. If there are exposures, and such protection does not exist, the distance to the property line that can be built upon shall be doubled.

⁴ When total quantity stored does not exceed 50 percent of the maximum per pile, the distance to property line that can be built upon and distance to street, alley, public way may be reduced 50 percent, but not less than 3 feet.

3.12. Incidental Storage of Flammable Liquids in Industrial Areas . Incidental storage will be authorized only after the following requirements are met: (Reference NFPA 30.)

3.12.1. Incidental storage will be in industrial areas only; (Reference NFPA 30.)

3.12.2. Storage will be in metal cabinets stenciled, “FLAMMABLE--KEEP FIRE AWAY” (metal wall lockers meet this requirement); (Reference NFPA 30.)

3.12.3. Storage will be limited to 1 gallon (4 liters) of Class I or 10 gallons (40 Liters) of Class II and Class III liquids, not to exceed 10 gallons (40 liters) total per cabinet, in closed containers. Storage will be limited to a 5-day supply of flammables in metal cabinet, and in closed containers not to exceed limits specified in paragraphs 3.8. and 3.10. Each work center will be limited to one cabinet ; (Reference NFPA 30.)

3.12.4. Fire department officials shall be consulted prior to establishing incidental storage areas in industrial shops. (Reference NFPA 30.)

3.13. Specific Applications :

3.13.1. Laboratories:

3.13.1.1. General. Many laboratory operations require special control of flammable and combustible liquids to protect personnel and equipment. Two types of laboratories are covered by this section: general laboratories and health-related laboratories. Refer to terms explained in **Attachment 1** and tables 3.5 and 3.6. (Reference NFPA 30.)

3.13.1.2. A list of working supplies and operating instructions on handling of flammable and combustible liquids will be published. The aggregate total outside of storage cabinets in any labo-

ratory will not exceed 10 gallons. All quantities of flammable and combustible liquids in one laboratory in excess of 10 gallons will be stored in an approved storage cabinet or in an approved storage room. Small quantities of water-reactive materials may be stored when protected from accidental contact with water. Flammable or combustible liquids will not be stored or transferred from one vessel to another in any exit way, corridor, or passageway leading to an exit. A minimum of one approved storage room will be available within any building housing a laboratory which regularly maintains a reserve storage capacity in excess of 300 gallons. (Reference NFPA 30.)

3.13.1.3. Flammable or combustible liquids shall not be brought into a laboratory, receiving, storage area, or storage facility unless adequately approved design, construction, and fire protection requirements are suitable for the hazard and quantity involved. Container types and maximum capacities will comply with either table 3.7 or 3.8 as appropriate. Plastic containers are sometimes used to avoid breakage problems posed by glass containers or contamination problems with metal containers. When used, plastic containers must be approved for the liquid used. Containers used to draw from an original container must be marked to identify its contents. Refrigerators or cooling equipment used to store or cool flammable liquids will be of an approved type for the material being stored or cooled. Refrigerators or cooling equipment will be labeled or stenciled “Approved for Flammable Liquid Storage.” See NFPA Standard 45, *Standard on Fire Protection for Laboratories Using Chemicals*, appendix A for additional details on “explosionproof,” “laboratory-safe,” modified domestic, or unmodified domestic refrigerators to achieve degrees of protection and appropriate labeling requirements. (Reference NFPA 45.)

3.13.1.4. Flammable and combustible liquids will not be positioned near Bunsen burners, hot surfaces, steam pipes, valves, or other sources of heat. (Reference NFPA 45.)

3.13.1.5. Refer to AFOSH Standard 48-22, *Occupational Exposure to Hazardous Chemicals in Laboratories*, for additional information regarding flammable, combustible, and hazardous materials handling in laboratories.

3.13.2. Fire Protection. All laboratories will have fire protection appropriate for their fire hazard classification. Fire protection will include, as a minimum, portable fire extinguishers, an alarm system, and an evacuation and emergency plan. For additional details regarding required fire protection requirements, refer to NFPA 45.

3.13.3. Disposal. Hazardous materials will normally be removed and disposed by a commercial disposal specialist who must comply with published environmental regulations. Contact the installation environmental coordinator in the Civil Engineering organization for assistance. Also refer to AFI 32-7042, *Solid and Hazardous Waste Compliance*. (Reference NFPA 30.)

Table 3.7. Maximum Allowable Size of Containers — General Laboratories.

Class of Flammable or Combustible Liquid	IA	IB	IC	II	III
Container Type					
Glass	1 pt ¹	1 qt ¹	1gal ²	1gal ²	1gal ²

Metal (Other than DOT drums) and Approved Plastic Safety Cans	1 gal	5 gal ³	5 gal ³	5 gal ³	5 gal ³
Safety Cans (metal)	2 gal	5 gal ³	5 gal ³	5 gal ³	5 gal ³
Metal drums (DOT Spec)	N/A	5 gal ³	5 gal ³	60 gal ³	60 gal ³

Reference NFPA 45.

NOTES:

¹ Nearest metric equivalent is acceptable. Sizes as large as 1 gallon or 4 liters may be used if the liquid would be adversely affected by storage in metal or if the liquid would cause excessive corrosion of the metal container.

² Nearest metric equivalent.

³ In instructional laboratories, containers of Class I or Class II liquids will not exceed 1 gallon or 3 liters, except for safety cans where 2 gallons capacity may be used.

Table 3.8. Maximum Allowable Size of Containers — Health-Related Laboratories.

Class of Flammable or Combustible Liquid	IA	IB	IC	II	III
Glass or approved plastic ¹	1 pt ²	1 qt ²	1 gal ²	1 gal ²	1 gal ²
Safety Cans	1 gal	2 gal	2 gal	2 gal	2 gal

Reference NFPA 45.

NOTES:

¹ Gravity feed containers not permitted.

² Nearest metric equivalent is acceptable.

3.14. Military Exchanges, Commissaries, and Associate Retail Stores . In rooms or areas accessible to the public, storage will be limited to quantities needed for display and normal merchandising purposes not to exceed 2 gallons per square foot of gross floor area. The gross floor area used for computing the maximum quantity permitted is that portion of the store actually being used for merchandising flammable and combustible liquids. (Reference 29 CFR 1910.106.)

3.14.1. Storage of Class IA liquids shall be prohibited in basement display areas and limited to 1 gallon per square foot on any other floor. In areas not protected, storage of Class IB, IC, and II liquids on

other than the ground floor shall be limited to 1 gallon per square foot of gross floor area. Protected shall mean protected with automatic sprinklers installed according to NFPA Standard 13, *Standard for the Installation of Sprinkler Systems*.

3.14.2. On floors above the ground level, the storage or display of Class I and Class II liquids shall be limited to 60 gallons in unprotected occupancies and 120 gallons in protected occupancies. (Reference NFPA 30.)

3.14.3. Containers in a display area will not be stacked more than 3 feet or two containers high, whichever is greater. (Reference NFPA 30.)

3.14.4. Shelving will be capable of supporting the load and containers on shelves must be arranged so they are not easily knocked off the shelves to the floor. (Reference NFPA 30.)

3.14.5. Leaking containers will be removed to a safe location outside the building, the contents transferred to an undamaged container, appropriately labeled, and the leaking container disposed in a safe manner. (Reference NFPA 30.)

3.14.6. Storage will be according to table 3.3. Buildings or portions of such buildings utilized for flammable and (or) combustible storage will be isolated by standard fire walls approved for the type and quantity of liquids being stored. Materials which create no fire hazard to the liquids may be stored in the same area. (Reference NFPA 30.)

3.14.7. If the storage building is located 50 feet or less from a building or adjacent property line that may be built upon, the wall facing the building or property lines will be a blank wall having a fire-resistance of at least 2 hours. (Reference NFPA 30.)

3.14.8. The total quantity of liquids within the building is not restricted, but the arrangement of storage will comply with table 3.3. (Reference NFPA 30.)

3.14.9. Stacked containers of flammable liquids will be separated by pallets or dunnage, where necessary, to provide stability and to prevent excessive stress on container walls. (Reference NFPA 30.)

3.14.10. No stack will be closer than 3 feet to the nearest beam, chord, girder, or other construction object, and will be at least 3 feet below sprinkler deflectors or discharge orifices of water spray or other installed fire protection systems. (Reference NFPA 30.)

3.14.11. Aisles at least 3 feet wide will be provided for clear access to doors, windows, or fire department connections. (Reference NFPA 30.)

3.14.12. Containers will bear clearly legible labels to identify contents and indicate hazards. (Reference NFPA 30.)

3.15. Small Gasoline Engine Powered Equipment . This section applies to: lawnmowers, snowblowers, generators, outboard marine motors, portable water pumps, small watercraft, powered gardening tools, and other implements powered by gasoline engines normally 5-horsepower or less. (Reference National Safety Council [NSC], *Accident Prevention Manual*, 10th Edition).

3.15.1. Fueling operations will be conducted in outside areas free from ignition sources. Fuel tanks will not be filled or drained inside buildings or other facilities where fuel vapors or other explosive gases can accumulate. (Reference NSC, *Accident Prevention Manual*, 10th Edition).

3.15.2. Operators will not refuel a running engine or one that is hot from recent use. They will allow a minimum of 5 minutes cooling time before starting refueling operations. (Reference NSC, *Accident Prevention Manual*, 10th Edition).

3.15.3. Fueling and (or) refueling operations will be accomplished using a safety can with pouring spout or an appropriate sized funnel. Care will be taken not to spill fuel onto hot surfaces. Spilled fuel will be cleaned up before attempts are made to start equipment. (Reference NSC, *Accident Prevention Manual*, 10th Edition).

3.15.4. Equipment will be serviced after use. Prior to extended off-season storage:

3.15.4.1. Equipment will be stored according to manufacturer's instructions.

3.15.4.2. The operator will ensure it is thoroughly cleaned, functioning properly, and the fuel tank is drained. (Reference NSC, *Accident Prevention Manual*, 10th Edition).

3.15.4.3. Storage facilities will be protected against tampering or unauthorized entry and area around the facility will be kept free of weeds, debris, and other combustibles. (Reference NSC, *Accident Prevention Manual*, 10th Edition).

3.15.4.4. Storage facilities will be inspected frequently by supervisor or building custodian. (Reference NSC, *Accident Prevention Manual*, 10th Edition).

3.15.5. Gasoline powered equipment will not be stored in military family housing living areas, including basements, unless the storage room or area has walls and is separated from the living area by an un-pierced 1-hour rated fire-resistant partition and ceiling. All storage areas must be inspected and approved by installation fire authorities. (Reference NFPA 30.)

3.15.6. Custodians of dormitories, multiple living quarters, assembly, institutional, military exchange, commissary and warehouse facilities will store small gasoline powered equipment in an enclosed 1-hour fire-rated storage room. Boiler rooms and other utility rooms will not be utilized as storage areas. (Reference NFPA 30.)

3.15.7. Cleaned and drained small gasoline powered equipment may be stored during the off-season in inspection and testing facilities, munitions maintenance facilities, fire stations, shops, and maintenance facilities. However, this equipment will not be stored in hangars, nose docks, corrosion control, fuel cell repair, or missile assembly and repair facilities. When stored, the equipment will be isolated from potential ignition sources. (Reference NFPA 30.)

3.15.8. Storage in theaters, conference facilities, open messes, clubs, recreation facilities, dormitories, temporary quarters, or multiple unit family housing buildings containing more than three dwelling units, and hotels is limited to 10 gallons or less of Class I and II liquids and 20 gallons or less of Class III liquids stored in containers in an approved storage container or in safety cans. (Reference NFPA 30.)

3.15.9. Storage of Class I, II, III liquids is limited to 10 gallons per resident unit. Included are single residences and those dwellings containing not more than three dwelling units with attached or detached garages. (Reference NFPA 30.

FRANCIS C. GIDEON, JR., Maj Gen, USAF
Chief of Safety

Attachment 1

GLOSSARY OF REFERENCES, ABBREVIATIONS, ACRONYMS, AND TERMS

References

Air Force Instruction (AFI) 32-7042, *Solid and Hazardous Waste Compliance*.

AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program* (formerly designated as Air Force Regulation [AFR] 127-12).

Air Force Manual (AFMAN) 23-210, *Joint Services Manual (JSM) for Storage and Handling*.

Air Force Occupational Safety and Health (AFOSH) Standard 48-21, *Hazard Communication* (formerly designated as AFOSH Standard 161-21).

AFOSH Standard 48-22, *Occupational Exposure to Chemicals in Laboratories* (formerly designated as AFOSH Standard 161-22).

AFOSH Standard 91-5, *Welding, Cutting, and Brazing* (formerly designated as AFOSH Standard 127-5).

AFOSH Standard 91-31, *Personal Protective Equipment* (formerly designated as AFOSH Standard 127-31).

AFOSH Standard 91-22, *Walking Surfaces, Guarding Floor and Wall Openings and Holes, Fixed Industrial Stairs, and Portable and Fixed Ladders* (formerly designated as AFOSH Standard 127-22).

AFOSH Standard 91-44, *Safety Color Coding, Labeling, and Marking* (formerly designated as AFOSH Standard 127-44).

AFOSH Standard 91-56, *Fire Protection and Prevention*, (formerly designated as AFOSH Standard 127-56).

AFOSH Standard 161-2, *Industrial Ventilation*.

American Society for Testing and Materials (ASTM) Standard 86-93, *Standard Test for Distillation of Petroleum Products*.

ASTM Standard D-5-65, *Test for Penetration for Bituminous Materials*.

ASTM Standard D-323-68, *Standard Method of Test for Vapor Pressure of Petroleum Products*.

National Safety Council (NSC), *Accident Prevention Manual for Business & Industry - Engineering & Technology*, 10th Edition.

National Fire Protection Association (NFPA) 13, *Standard for the Installation of Sprinkler Systems*.

NFPA 30, *Flammable and Combustible Liquids Code*.

NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*.

NFPA 70, *National Electrical Code*.

NFPA 80, *Standard for Fire Doors and Fire Windows*.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Materials*.

NFPA 251, *Standard Methods of Tests of Fire Endurance of Building Construction and Materials*.

Occupational Safety and Health Association (OSHA) Standard 29 Code of Federal Regulations (CFR) 1910.106, *Flammable and Combustible Liquids*.

OSHA Standard 29 CFR 1910.1200, *Hazard Communication*.

OSHA Standard 29 CFR 1926.152, *Flammable and Combustible Liquids*.

Abbreviations and Acronyms

AFCESA—Air Force Civil Engineer Support Agency

AFI—Air Force Instruction (new designation)

AFIA—Air Force Inspection Agency

AFMAN—Air Force Manual (new designation)

AFOSH—Air Force Occupational Safety and Health

AFR—Air Force Regulation (obsolete designation)

AFSC—Air Force Safety Center

ANSI—American National Standards Institute

ASTM—American Society for Testing and Materials

BE—Bioenvironmental Engineering

C—Celsius

Ce—Cerium

CFR—Code of Federal Regulations

DOT—Department of Transportation

DRU—Direct Reporting Unit

F—Fahrenheit

FOA—Field Operating Agency

Ft—Foot and (or) Feet

Gal—Gallon

HAZMAT—Hazardous Materials

Hg—Mercury

HQ—Headquarters

JSM—Joint Services Manual

K—Potassium (Kalium)

LEL—Lower Explosive Limit

Li—Lithium

MAJCOM—Major Command

MIL-HDBK—Military Handbook

mm—Millimeters

MSDS—Material Safety Data Sheet

Na—Sodium (Natrium)

NATO—North Atlantic Treaty Organization

NFPA—National Fire Protection Association

NIOSH—National Institute for Occupational Safety and Health

No—Number

NSC—National Safety Council

OSHA—Occupational Safety and Health Administration

PDO—Publishing Distribution Office

PMEL—Precision Measurement Equipment Laboratory (also known as Test Measurement Diagnostic Equipment [TMDE])

PPE—Personal Protective Equipment

psia—Pounds per Square Inch, Absolute

psig—Pounds per Square Inch, Gauge

SG—Surgeon General

SQ—Square

TMDE—Test Measurement Diagnostic Equipment (see PMEL)

UL—Underwriter's Laboratory

U.S.C.—United States Code

WWW—World-Wide Web

Terms

Aerosol—A material which is dispensed from its container as a mist, spray, or foam by propellant under pressure.

Approved— Listed or approved by Underwriter's Laboratory (UL), Incorporated, Factory Mutual Engineering Corporation, The Bureau of Mines, National Institute of Occupational Safety and Health (NIOSH), The American National Standards Institute (ANSI), The National Fire Protection Association (NFPA), or other nationally recognized agencies which list, approve, test, or develop specifications for equipment to meet fire protection, health, or safety requirements.

Assembly Occupancy— All buildings or portions of buildings used for gathering 50 or more persons for purposes as deliberation, entertainment, amusement, or awaiting transportation.

Basement— A story of a building or structure having one-half or more of its height below ground level and to which access for fire fighting purposes is unduly restricted.

Boiling Point— The temperature at which a liquid exerts a vapor pressure equal to the surrounding atmospheric pressure. For mixtures that do not have a constant boiling point for purposes of this standard, the 20 percent evaporated point of a distillation performed according to American Society for Testing and Materials (ASTM) Standard 86-93, *Standard Test for Distillation of Petroleum Products*, shall be used as the boiling point of the liquid.

Closed Container— A container sealed with a lid or other closing device to prevent liquid and (or) vapor from escaping at atmospheric temperatures and pressures.

Combustible Liquid— A liquid having a closed cup flashpoint at or above 100 degrees F (37.8 degrees C). Combustible liquids are categorized as Class II or Class III liquids and they are further subdivided as follows: (Reference NFPA 30.)

Class II liquids are those having a flashpoint at or above 100 degrees F (37.8 degrees C) and below 140 degrees F (60 degrees C). (Reference NFPA 30.)

Class IIIA liquids are those having flashpoint at or above 140 degrees F (60 degrees C) and below 200 degrees F (93.35 degrees C), except any mixture having components with flashpoints of 200.5 degrees F (93 degrees C), or higher, the total volume of which may be 99 percent or more of the total volume of the mixture. (Reference NFPA 30.)

Class IIIB liquids are those having flashpoints at or above 200 degrees F (93 degrees C).

Fire Area— An area of a building separated from the remainder of the building by construction having a fire resistance of at least 1 hour and having all communicating openings properly protected by an assembly having a fire resistance rating of at least 1 hour.

Flammable Liquids— A liquid with a closed cup flashpoint below 100 degrees F (37.8 degrees C) and having a vapor pressure not exceeding 40 psig (2068 mm Hg) at 100 degrees F (37.8 degrees C). Flammable liquids are categorized as Class I liquids and are further subdivided as follows: (Reference NFPA 30.)

Class IA are those that have a flashpoint below 73 degrees F (22.8 degrees C) and have a boiling point below 100 degrees F (37.8 degrees C).

Class IB are those that have a flashpoint below 73 degrees F (22.8 degrees C) and have a boiling point at or above 100 degrees F (37.8 degrees C).

Class IC are those that have a flashpoint at or above 73 degrees F (22.8 degrees C) and below 100 degrees F (37.8 degrees C).

Flammable Aerosol— An aerosol that is required to be labeled “Flammable” under the Federal Hazardous Substance Labeling Act (15 United States Code [U.S.C.] 1261). These aerosols are considered Class IA liquids.

Flashpoint— The minimum temperature at which a liquid gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. Flashpoints are established using approved test methods listed in OSHA Standard 1910.106.

General Laboratories— A room or rooms or buildings where research, testing, analysis, or investigation takes place. General laboratories are classified as Class A, B, or C according to quantities of flammable and combustible liquids present as specified in NFPA 45. General laboratories will be designed, constructed, equipped, operated, and maintained according to requirements of NFPA 45.

NOTE: NFPA 45 does not apply to physical electronic instrument, or similar laboratories, that use small quantities of chemicals for incidental purposes. Precision Measurement Equipment Laboratories (PMEL) -- also known as Test Measurement Diagnostic Equipment (TMDE) -- would be classified as listed under this exemption.

General-Purpose Warehouse— A separate, detached building or portion of a building used for warehousing-type operations. **NOTE:** Warehousing operations referred to in this standard are those not accessible to the public and include general purpose, merchandise, distribution, and industrial warehouse-type operations.

Health Related Laboratories— A room or rooms located in any part of a building providing patient care and intended to serve activities engaged in investigation, diagnosis, or treatment. Also, rooms or buildings used to conduct research, analysis, or investigation of occupational health problems.

Liquid— Any material with a fluidity greater than that of 300 penetration asphalt when tested according to ASTM D-5-65, *Test for Penetration for Bituminous Materials*. When not otherwise identified, the term “liquid” will include both flammable and combustible liquids.

May— Indicates an acceptable or satisfactory method of accomplishment.

Portable Tank— A closed container having a liquid capacity over 60 gallons and not for permanent installation.

Pressure Vessel— A storage tank or container designed to operate at pressures above 15 pounds per square inch gauge (psig).

Safety Can— An approved flammable liquid container of not more than 5 gallon (18.9L) capacity, having a spring-closing lid and spout cover and designed so it will safely relieve internal pressure when subjected to fire exposure.

Shall— Indicates a mandatory requirement.

Storage Refrigerator for Flammable— A unit designed or modified so the storage compartment, to include the door and door frame, meets the requirements for Class I, Division 1 locations as described in NFPA 70.

Should— Indicates a preferred method of accomplishment.

Unstable Reactive Liquid— A liquid (in pure state or commercially produced or transported) which will vigorously polymerize, decompose, condense, or become self-reactive and undergo a violent chemical change under conditions of shock, pressure, temperature, or combinations thereof.

Vapor Pressure— The pressure in pounds per square inch, absolute (psia) exerted by a volatile liquid as determined by the Reid Method, ASTM D323-68 *Standard Method of Test for Vapor Pressure of Petroleum Products*.

Ventilation— As specified in this standard, for the prevention of fire and explosion. It is considered adequate if it is sufficient to prevent accumulation of significant quantities of vapor-air mixtures in concentration over one-fourth of the lower flammable limit.

Will— Is also used to indicate a mandatory requirement and in addition is used to express a declaration of intent, probability, or determination.

Attachment 2

CHECKLIST FLAMMABLE AND COMBUSTIBLE LIQUIDS

This is not an all-inclusive checklist. It simply highlights some critical items in this standard. Other requirements exist in the standard that are not included in the checklist. Where appropriate, MAJCOMs, DRUs, FOAs, local safety staffs, and supervisors will add to this checklist to include command or mission and (or) work-unique requirements or situations.

A2.1. Have all personnel handling, storing or using flammable or combustible liquids received the appropriate levels of training commensurate with the degree of hazard? (Reference paragraph 3.1.2.)

General Requirements:

A2.2. Have all personnel been provided with the appropriate PPE , been trained on its use, care, maintenance and reporting procedures on unserviceable PPE. (Reference paragraph 3.1.2.)

Facility Pre-Fire Plans:

A2.3. Has the Fire Department developed pre-fire plans for the flammable and combustible liquids area? (Reference paragraph 3.2.)

General Requirements -- Containers:

A2.4. Have appropriate containers and portable tanks been procured to meet handling, storage, and dispensing requirements? (Reference paragraph 3.3.)

A2.5. Is the capacity of flammable or combustible liquid containers according to table 3.1? (Reference paragraph 3.3.1.)

A2.6. Are flammable and combustible liquids prohibited from office occupancies except those required for maintenance and operation of building and operating equipment? (Reference paragraph 3.3.3.)

Storage Cabinets:

A2.7. Is no more than 120 gallons of Class I, Class II, and Class IIIA liquids being stored in a storage cabinet? (Reference paragraph 3.4.)

A2.8. Are no more than three cabinets (120 gallons) located in a single fire area? (Reference paragraph 3.4.)

A2.9. If additional cabinets are located in an industrial area are they separated from the others by at least 100 feet? (Reference paragraph 3.4.)

A2.10. Are cabinets conspicuously labeled “Flammable — Keep Fire Away”? (Reference paragraph 3.4.1.)

A2.11. Are storage cabinets in use designed and constructed to meet the requirements of NFPA 251? (Reference paragraph 3.4.1.)

A2.12. Are the bottom, top, and sides of metal cabinets at least No 18 gauge sheet steel and double walled with 1-1/2 inch air space? (Reference paragraph 3.4.3.)

A2.13. Does the door have a three-point lock and is the door sill raised at least 2 inches above the bottom of the cabinet? (Reference paragraph 3.4.3.)

A2.14. Do existing wood cabinets meet the following criteria? (Reference paragraph 3.4.5.)

A2.14.1. The bottom, sides and top are constructed of knot-free wood of at least 1-inch nominal thickness?

A2.14.2. All joints are rabbetted and fastened in two directions with flathead screws?

A2.14.3. When more than one door is used, is there at least a rabbetted overlap of 1 inch?

A2.14.4. Hinges are mounted in a way so they do not lose their holding capacity when subjected to fire?

Inside Storage Rooms:

A2.15. Are inside storage rooms constructed to meet the fire-resistive test specifications of NFPA 251? (Reference paragraph 3.5.)

A2.16. Do openings to other rooms or buildings have noncombustible liquid-tight raised sills or ramps at least 4 inches in height or, as an alternate, is the floor in the storage area at least 4 inches lower than the surrounding floors? (Reference paragraph 3.5.)

A2.17. Are rooms liquid-tight where walls join the floor? (Reference paragraph 3.5.)

A2.18. Is the wood used for shelves, racks, dunnage, scuffboards and floor overlays at least 1 inch nominal thickness? (Reference paragraph 3.5.)

A2.19. Are self-closing fire doors meeting the requirements of NFPA 80 used? (Reference paragraph 3.5.)

A2.20. Are Class I liquids prohibited from being stored or handled within building having a basement or pit unless ventilation is provided? (Reference paragraph 3.5.)

Electrical:

A2.21. Does electrical wiring and equipment located within flammable or combustible storage rooms meet the requirements of NFPA 70 for hazardous location as determined by the class of materials stored? (Reference paragraph 3.6.1.)

A2.22. Are containers used for dispensing or transferring of liquids electrically interconnected (bonded) to prevent static discharges? (Reference paragraph 3.6.2.)

Ventilation:

A2.23. Is every inside storage room provided with a gravity or mechanical exhaust ventilation system? (Reference paragraph 3.7.)

A2.24. Are areas in which flammable or combustible liquids are transferred simultaneously of quantities greater than 5 gallons from one container to another separated from the other operation by 25 feet or by fire-resistant construction of at least 1 hour? (Reference paragraph 3.7.)

A2.25. Is drainage provided in locations where dispensing or transfers are accomplished? (Reference paragraph 3.7.)

A2.26. Is exhaust air taken from a point near a wall and within 1 foot of the floor on one side of the room with one or more make-up air inlets on the opposite side of the room within 1 foot of the floor? (Reference paragraph 3.7.1.)

A2.27. Is the location of both the make-up and exhaust air openings arranged to provide, as practical, air movement across all portions of the floor, to prevent the accumulation of vapors? (Reference paragraph 3.7.1.)

A2.28. Does exhaust air from the room go directly to the exterior of the building; and if ducts are used, are they not used for any other purpose? (Reference paragraph 3.7.1.)

A2.29. Is duct construction and air movement according to AFOSH Standard 48-2? (Reference paragraph 3.7.4.)

Additional Requirements for Inside Rooms:

A2.30. Are storage and fire resistive rating in compliance with table 3.2? (Reference paragraph 3.8.)

A2.31. Are 3-foot aisles maintained in all inside storage areas? (Reference paragraph 3.8.)

A2.32. Are containers over 30-gallon capacity not stacked one upon the other? (Reference paragraph 3.8.)

A2.33. Is there at least one 20-B portable fire extinguisher located no closer than 10 feet nor more than 50 feet from any Class I or Class II liquid storage area? (Reference paragraph 3.8.1.)

A2.34. Is there at least one portable fire extinguisher rated not less than 10-BC located between 10 and 25 feet of any Class I or Class II liquid storage area outside of a storage room but inside a building? (Reference paragraph 3.8.2.)

Storage Inside Buildings:

A2.35. Does inside storage comply with the following basic conditions where approved storage cabinets or rooms are not provided? (Reference paragraph 3.9.)

A2.35.1. The storage of any flammable or combustible liquids does not physically obstruct a means of egress from the building or area? (Reference paragraph 3.9.1.)

A2.35.2. Containers of flammable or combustible liquids remain tightly sealed except when transferred, poured, or applied? Only that portion in the storage container required to accomplish a particular job is removed? (Reference paragraph 3.9.2.)

A2.35.3. Leaking containers are removed to a safe location outside the building and the contents transferred to an undamaged container? (Reference paragraph 3.9.3.)

A2.35.4. If a flammable or combustible storage building is used, it is a one-story building devoted principally to the handling and storing of flammable and combustible liquids? Does the building have a 2-hour fire rated exterior wall having no openings within 10 feet of such storage? (Reference paragraph 3.9.4.)

A2.35.5. Are flammable paints, oils, and varnishes in 1 to 5 gallon containers, used for building maintenance purposes, only stored temporarily in closed containers outside approved storage cabinets or rooms if kept at the job site for less than 10 calendar days? (Reference paragraph 3.9.5.)

A2.35.6. Water reactive materials are not stored in the same room with flammable and combustible liquids? (Reference paragraph 3.9.7.)

A2.36. Do base supply warehouses, base exchange storage rooms, and commissary storage areas comply with table 3.3? (Reference paragraph 3.9.8.)

A2.37. Are buildings or portions of buildings used for the storage flammable or combustibles storage isolated by standard fire walls approved for the type and quantity of liquids being stored? (Reference paragraph 3.9.8.)

A2.38. If the storage building is located 50 feet or less from a building or adjoining property line that may be built upon, is the wall facing the building or property line a blank wall having a fire-resistance rating of at least 2 hours? (Reference paragraph 3.9.9.)

A2.39. Does the arrangement of storage within a building comply with tables 3.3 and 3.4? (Reference paragraph 3.9.10.)

A2.40. Are stacked containers of flammable liquids separated by pallets or dunnage, where necessary, to provide stability and to prevent excessive stress on container walls? (Reference paragraph 3.9.11.)

A2.41. Are portable tanks which are stored over one tier high designed to nest securely without dunnage? (Reference paragraph 3.9.12.)

A2.42. Is adequate material handling equipment available to handle tanks safely at upper tier levels? (Reference paragraph 3.9.12.)

A2.43. Is no stack closer than 3 feet to the nearest beam, chord, girder, or other obstruction and at least 3 feet below sprinkler deflector or discharge orifices of water spray or other installed fire protection system? (Reference paragraph 3.9.13.)

A2.44. Are aisles at least 3 feet wide provided for clear access to doors, windows, or fire department standpipe connections? (Reference paragraph 3.9.14.)

A2.45. Do containers bear clearly legible labels to identify contents and indicate hazards? (Reference paragraph 3.9.15.)

Outside Storage: Refer to tables 3.5 and 3.6 for maximum quantities and separation distance criteria for outside storage of flammable and combustible liquids. (Reference paragraph 3.10.)

A2.46. If 1,100 total gallons (maximum) of flammable or combustible liquids are located adjacent to another building is:

A2.46.1. A minimum distance of 10 feet between buildings and the nearest flammable or combustible liquid maintained? (Reference paragraph 3.10.1.1.)

A2.46.2. The storage area graded according to paragraph 3.10.3.? (Reference paragraph 3.10.1.2.)

A2.46.3. The storage area protected against tampering or unauthorized entry when necessary? (Reference paragraph 3.10.1.3.)

A2.46.4. The storage area kept free of weeds and other combustible material not necessary to storage? (Reference paragraph 3.10.1.3.)

A2.47. Where the quantity of stored material exceeds 1,100 gallons do the separation distances comply with table 3.6? (Reference paragraph 3.10.2.)

A2.48. When curbs are used, are provisions made for draining accumulations of ground or rain water or spills of flammable or combustible liquids? (Reference paragraph 3.10.3.)

A2.49. Do drains terminate at a safe location and are they directly accessible to the fire department? (Reference paragraph 3.10.3.)

A2.50. Is at least one portable fire extinguisher rated not less than 20-BC located not less than 10 feet, nor more than 25 feet, travel distance of any Class I or Class II liquid storage area outside of a storage room? (Reference paragraph 3.10.4.)

A2.51. Are installed fire suppression systems of an approved type? (Reference paragraph 3.10.5.)

A2.52. Are containers and portable tanks used for Class I liquids grounded and bonded during liquid transfer? (Reference paragraph 3.10.6.)

A2.53. Are containers having flammable or combustible liquids protected from external heat sources? (Reference paragraph 3.10.7.)

A2.54. Are open flame devices or smoking prohibited within 50 feet of the flammable or combustible storage area? (Reference paragraph 3.10.7.)

A2.55. Are welding, cutting, and brazing operations accomplished according to AFOSH Standard 91-5? (Reference paragraph 3.10.8.)

Handling Flammable and Combustible Liquids:

A2.56. Are flammable or combustible liquids drawn from or transferred into vessels, containers, or portable tanks within a building only through a closed piping system, from safety cans, by means of a device drawing through the top, or from a container or portable tank by gravity through an approved closing valve? (Reference paragraph 3.11.)

A2.57. Is compressed air or gas not used for pressurizing a vessel containing a flammable liquid? (Reference paragraph 3.11.)

A2.58. Are approved safety cans used for transporting and dispensing flammable liquids in quantities of 5 gallons or less? (Reference paragraph 3.11.1.)

A2.59. Are flammable liquids kept in covered containers when not actually in use? (Reference paragraph 3.11.2.)

A2.60. Are plans made and means available to promptly clean up or remove spills? (Reference paragraph 3.11.3.)

A2.61. Are Class I liquids used only where there are no open flames or other sources of ignition within the area or possible path of vapor travel? (Reference paragraph 3.11.4.)

A2.62. Are safety cans or portable containers of flammable liquids, having a flashpoint at or below 80 degrees F, painted red with some additional clearly visible identification in a yellow band around the can or the name of the contents conspicuously stenciled or painted on the can in yellow? (Excluded are shipping containers.) (Reference paragraph 3.11.5.)

Incidental Storage of Flammable Liquids in Industrial Areas:

A2.63. Is incidental storage of flammable liquids only authorized in industrial areas if: (Reference paragraph 3.12.1.)

A2.63.1. Storage cabinets are stenciled "Flammable — Keep Fire Away" (Metal wall lockers meet this requirement)? (Reference paragraph 3.12.1.1.)

A2.63.2. Storage is limited to 1 gallon of Class I or 10 gallons of class II and Class III liquid, not exceeding 10 gallons total per cabinet, in closed containers? (Reference paragraph 3.12.1.2.)

A2.63.3. Storage is limited to a 5-day supply of flammables in metal cabinet, and in closed containers not to exceed limits specified in paragraphs 3.8. and 3.10.? (Reference paragraph 3.12.1.2.)

A2.63.4. Each work center is limited to only one cabinet? (Reference paragraph 3.12.1.2.)

Laboratories:

A2.64. Has a list of working supplies and operating instructions on handling of flammable and combustible liquids been developed? (Reference paragraph 3.13.1.2.)

A2.65. Does the aggregate total outside of storage cabinets not exceed 10 gallons of flammable or combustible liquids? (Reference paragraph 3.13.1.2.)

A2.66. If the total quantity of flammable or combustible liquids exceeds 10 gallons, are they stored in an approved storage cabinet or storage room? (Reference paragraph 3.13.1.2.)

A2.67. Are flammable or combustible liquids prohibited from being stored or transferred from one vessel to another in any exit way, corridor, or passageway leading to an exit? (Reference paragraph 3.13.1.2.)

A2.68. Is a minimum of one approved storage room available within any building housing a laboratory which regularly maintains a reserve storage capacity in excess of 300 gallons? (Reference paragraph 3.13.1.2.)

A2.69. Are flammable and combustible liquids prohibited from receiving, storage areas, or storage facilities unless adequately approved design, construction, and fire protection requirements are suitable for the hazard and quantity involved? (Reference paragraph 3.13.1.3.)

A2.70. Are approved plastic, metal, or glass container used when appropriate? (Reference paragraph 3.13.1.3.)

A2.71. Are containers used to draw from an original container marked to identify its contents? (Reference paragraph 3.13.1.3.)

A2.72. Are refrigerators or cooling equipment used to store flammable liquids of the approved type for the material being stored? (Reference paragraph 3.13.1.3.)

A2.73. Are refrigerators or cooling equipment labeled or stenciled “Approved for Flammable Liquid Storage”? (Reference paragraph 3.13.1.3.)

A2.74. Are flammable and combustibles kept away from open flames, hot surfaces, steam pipes, or other heat sources? (Reference paragraph 3.13.1.4.)

A2.75. Do all laboratories have fire protection appropriate for their fire hazard classification? (Reference paragraph 3.13.2.)

Military Exchanges, Commissaries, and Associated Retail Stores:

A2.76. In rooms or other areas accessible to the public, is storage limited to quantities needed for display and normal merchandising purposes not to exceed 2 gallons per square foot of gross floor area? (Reference paragraph 3.14.)

A2.77. Is the gross floor area used for computing the maximum quantity permitted that portion of the store actually being used for merchandising flammable and combustible liquids? (Reference paragraph 3.14.)

A2.78. Are Class IA flammable prohibited in basement areas and limited to 1 gallon per square foot on any other floor? (Reference paragraph 3.14.1.)

A2.79. Are Class IB, IC, and II liquids in areas not protected limited to 1 gallon per square foot of gross floor area? (Reference paragraph 3.14.1.)

A2.80. On floors above ground level, is storage or display of Class I and Class II liquids limited to 60 gallons in unprotected occupancies and 120 gallons in protected occupancies? (Reference paragraph 3.14.2.)

A2.81. Are containers in a display **not** stacked more than 3 feet or two containers high, whichever is greater? (Reference paragraph 3.14.3.)

A2.82. Is shelving capable of supporting the load and are containers on the shelves arranged so that are not easily knocked off the shelves to the floor? (Reference paragraph 3.14.4.)

A2.83. Are leaking containers removed to a safe location and the contents transferred to an undamaged container, appropriately labeled, and the leaking container disposed of in a safe manner? (Reference paragraph 3.14.5.)

A2.84. Is storage of flammable and combustibles according to table 3.3? (Reference paragraph 3.14.6.)

A2.85. If the storage building is located less than 50 feet from another building or property line that may be built upon, is the wall facing the building or property line blank and have a fire-resistive rating of at least 2 hours? (Reference paragraph 3.14.7.)

A2.86. Is the storage of flammable and combustibles in compliance with table 3.3? (Reference paragraph 3.14.8.)

A2.87. Are stacked containers separated by pallets or dunnage where necessary, to provide stability and to prevent excessive stress on the containers? (Reference paragraph 3.14.9.)

A2.88. Are stacks no closer than 3 feet from the nearest beam, chord, girder, or other construction object, and no closer than 3 feet below sprinkler deflector or discharge orifices of water spray or other installed fire protection system? (Reference paragraph 3.14.10.)

A2.89. Are 3-foot aisles provided for clear access to doors, windows, or fire department connections? (Reference paragraph 3.14.11.)

A2.90. Do all containers bear clearly legible labels to identify contents and indicate hazards? (Reference paragraph 3.14.12.)

Small Gasoline Engine Powered Equipment:

A2.91. Are fueling operations conducted in outside areas free from ignition sources? (Reference paragraph 3.15.1.)

A2.92. Are fuel tanks **not** filled or drained inside buildings or other facilities where vapors can accumulate? (Reference paragraph 3.15.1.)

A2.93. Are refueling operations conducted after engines have had a minimum of 5 minutes of cooling? (Reference paragraph 3.15.2.)

A2.94. Are refueling operations accomplished using a safety can with pouring spout or funnel? (Reference paragraph 3.15.3.)

A2.95. Are fuel spills appropriately cleaned up before attempting to start any engine? (Reference paragraph 3.15.3.)

A2.96. Is equipment serviced after use? (Reference paragraph 3.15.4.)

A2.97. Prior to extended off-season storage, is the equipment thoroughly cleaned and the fuel tank drained? (Reference paragraph 3.15.4.)

A2.98. Are storage facilities protected against tampering or unauthorized entry and the area around the facility free of weeds, debris, and other combustibles? (Reference paragraph 3.15.4.1.)

A2.99. Are all storage areas or facilities inspected frequently by supervision or building custodian? (Reference paragraph 3.15.4.2.)

A2.100. Is gasoline powered equipment not stored in military housing living areas including basements, unless the storage room has a wall to separate it from the living by an un-pierced 1-hour rated fire-resistant partition and ceiling? (Reference paragraph 3.15.5.)

A2.101. Are storage areas in military family housing inspected and approved by the installation fire authorities prior to use? (Reference paragraph 3.15.5.)

A2.102. Do custodians of dormitories, multiple living quarters, assembly, institutional, military exchanges, commissary, and warehouse facilities store small gasoline equipment in an enclosed 1-hour fire-rated storage room? (Reference paragraph 3.15.6.)

A2.103. Are boiler rooms, equipment rooms and other utility rooms not utilized as storage areas? (Reference paragraph 3.15.6.)

A2.104. Are only cleaned and drained small gasoline powered equipment stored during the off-season in inspection and testing facilities, munitions maintenance facilities, fire stations, shops and maintenance facilities? Are there restrictions on storing this equipment in hangars, nose docks, corrosion control, fuel cell repair, or missile assembly and repair facilities? (Reference paragraph 3.15.7.)

A2.105. When stored in approved facilities is the equipment isolated from potential ignition sources? (Reference paragraph 3.15.7.)

A2.106. Is storage limited to 10 gallons of Class I and II liquids and 20 gallons or less of Class III liquids in theaters, conference facilities, open messes, clubs, recreation facilities, dormitories, temporary quarters, multiple unit housing, buildings containing more than three dwelling units, and hotels? (Reference paragraph 3.15.8.)

A2.107. Is storage of Class I, II, III liquids limited to 10 gallons per resident unit in single residences and those dwellings containing not more than three dwelling units with detached garages? (Reference paragraph 3.15.9.)